

Sustainable Energy Systems and Environmental Fluid Dynamics

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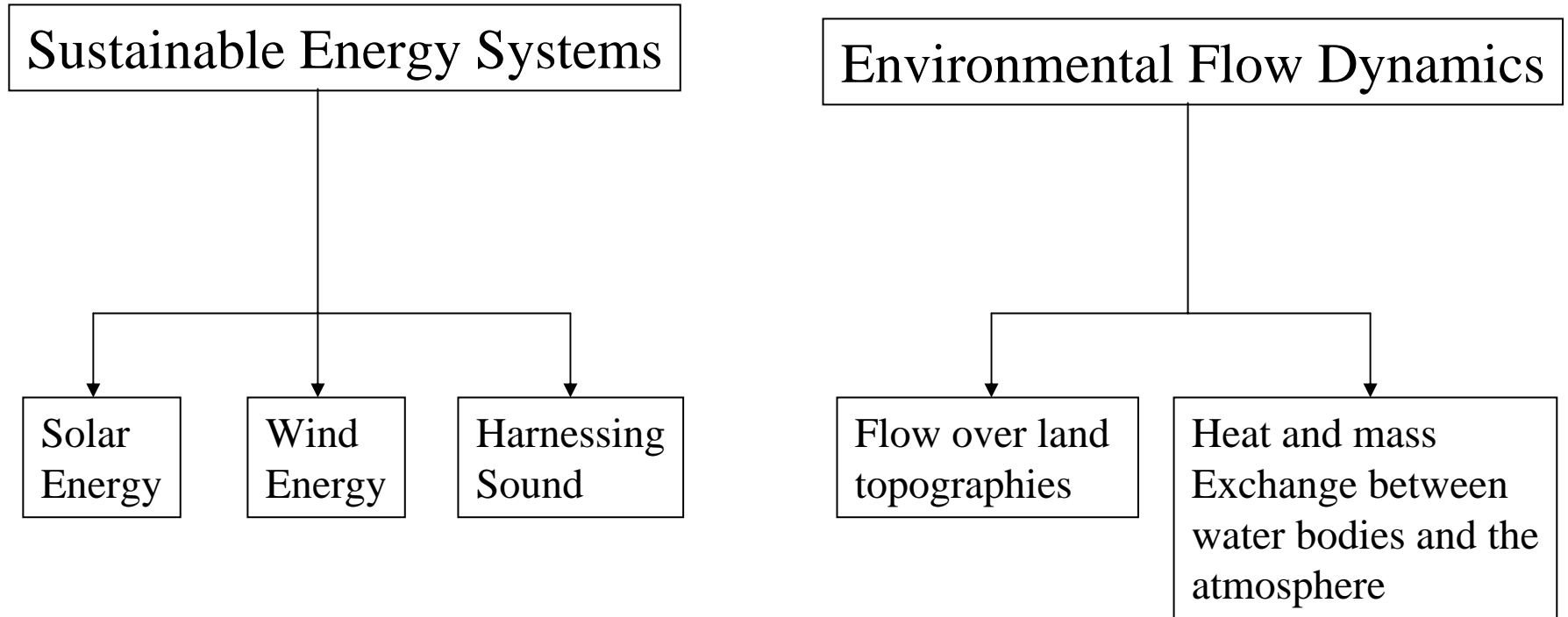
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Research Areas

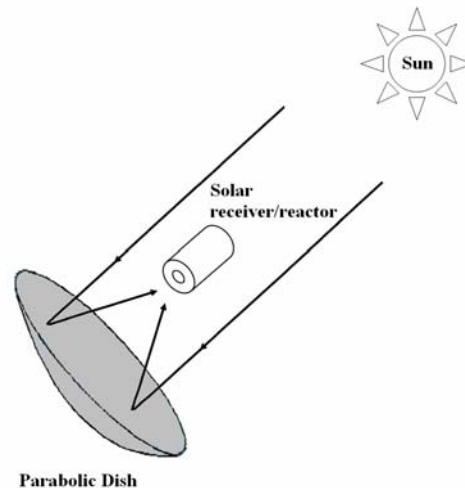


Experimental facility:

- Particle Image Velocimetry (PIV), for non-intrusive velocity measurements
- Laser Induced Fluorescence (LIF), for non-intrusive concentration measurements

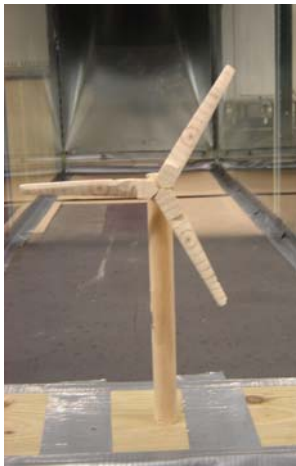
Solar Energy

- Solar energy incident on earth is 15000 times the energy utilized worldwide.
- The research is focused on two types of systems,
 - Solar water heating system
 - Special focus on systems for cold climate
 - Concentrated solar energy system (high temperature applications)
 - Generates high temperatures of the order of 1000 C in the solar receiver

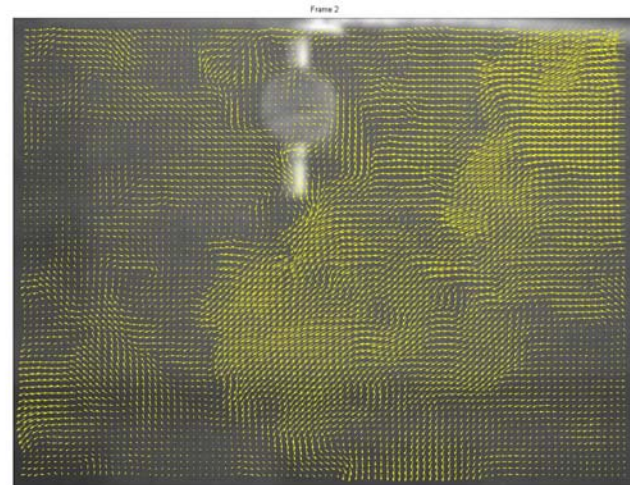


Wind Energy

- Research is focused on the following aspects,
 - Flow behavior of wind turbines
 - Environmental impact of wind farms



Model

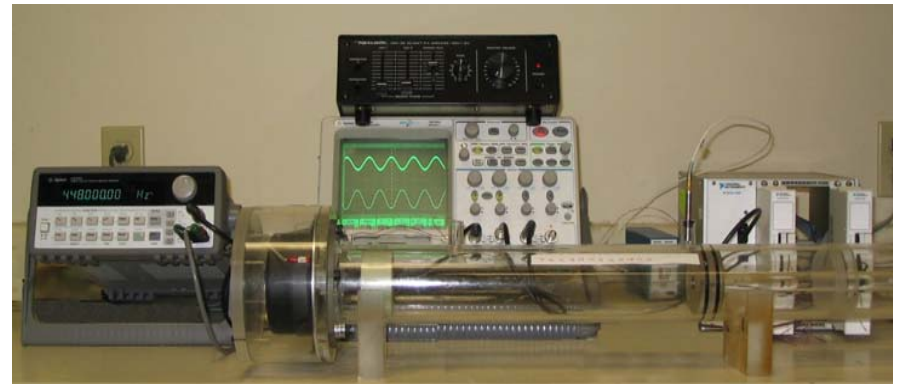
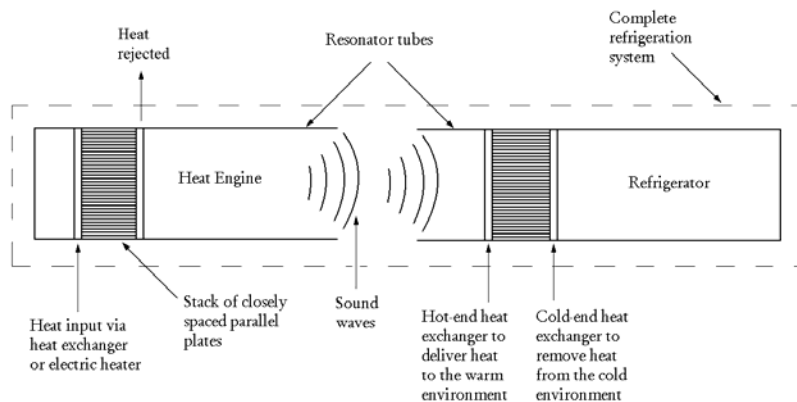


Velocity field

Harnessing Sound

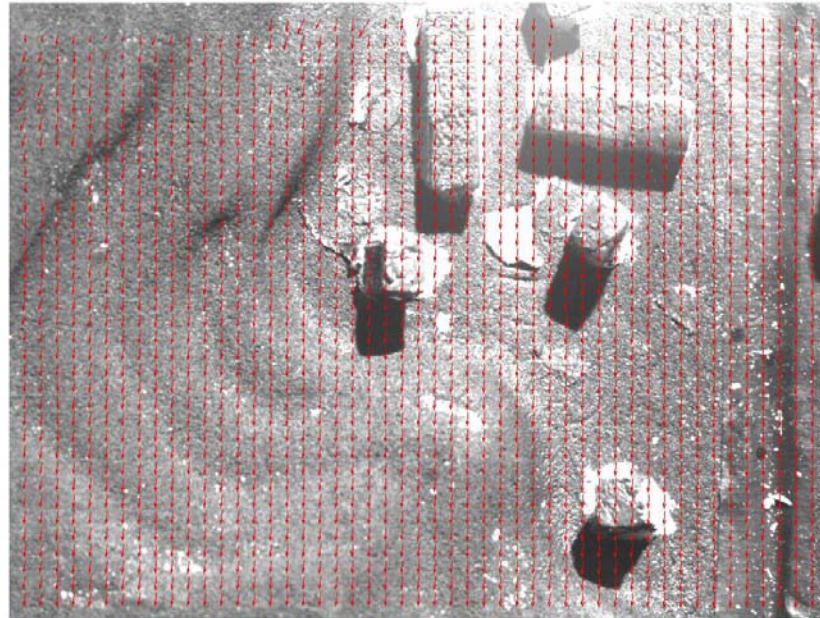
(Thermoacoustics)

- Thermoacoustics deals with the conversion of heat energy into sound energy and vice versa.
- Acoustic energy (sound) can be harnessed in sealed systems and used for refrigeration.
- Solar energy or waste heat could be used to produce sound.
- Simple in design, easy to fabricate, environmentally friendly.



Environmental Fluid Dynamics

- Flow behavior over the land
 - Flow over different topographies.



Velocity field over a ridge and buildings

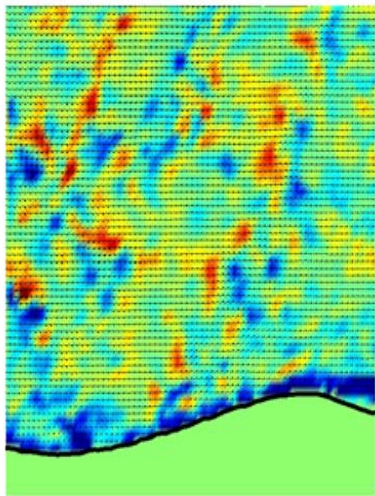
- Air-water interactions

- Velocity measurements above and below the water surface.

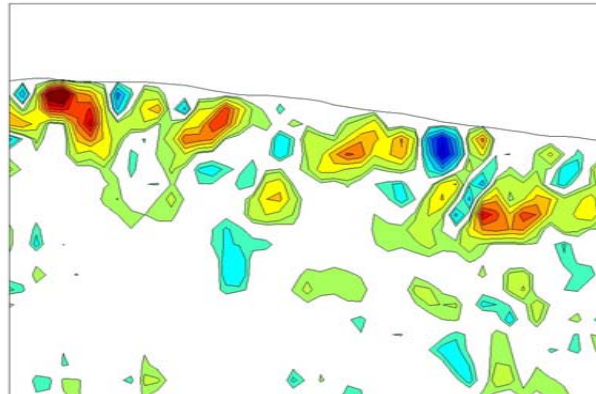
- Understanding the energy and mass exchange between the two mediums

- In the presence of waves

- In the absence of waves (calm condition)



Flow above waves



Flow beneath waves

Interests

- Environmental flows
 - Over land or water
 - In the polar region
- Development of energy systems suitable for rural/remote areas using,
 - Conventional energy e.g. oil, gas
 - Alternative energy e.g. solar, wind, geothermal
 - Combined (alternative + conventional)